Kramer Electronics, Ltd.

USER MANUAL

Model:

VS-88H

8x8 HDMI Matrix Switcher

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1 Introduction

Welcome to Kramer Electronics! Since 1981, Kramer Electronics has been providing a world of unique, creative, and affordable solutions to the vast range of problems that confront the video, audio, presentation, and broadcasting professional on a daily basis. In recent years, we have redesigned and upgraded most of our line, making the best even better! Our 1,000-plus different models now appear in 11 groups[1] that are clearly defined by function.

Congratulations on purchasing your Kramer **VS-88H** *8x8 HDMI Matrix Switcher*.

The **VS-88H** is ideal for conference room presentations and advertising applications, as well as for rental and staging.

Each package includes the following items:

- **VS-88H** *8x8 HDMI Matrix Switcher*
- Power cord
- Windows®-based Kramer control software[2]
- Windows®-based Ethernet Configuration Manager and Virtual Serial Port Manager
- Kramer **RC-IR3** Infrared Remote Control Transmitter (including the required batteries and a separate user manual[3])
- This user manual[3]

2 Getting Started

We recommend that you:

- Unpack the equipment carefully and save the original box and packaging materials for possible future shipment
- Review the contents of this user manual
- Use Kramer high performance high resolution cables[4]

1 GROUP 1: Distribution Amplifiers; GROUP 2: Switchers and Matrix Switchers; GROUP 3: Control Systems; GROUP 4: Format/Standards Converters; GROUP 5: Range Extenders and Repeaters; GROUP 6: Specialty AV Products; GROUP 7: Scan Converters and Scalers; GROUP 8: Cables and Connectors; GROUP 9: Room Connectivity; GROUP 10: Accessories and Rack Adapters; GROUP 11: Sierra Products

2 Downloadable from our Web site at http://www.kramerelectronics.com

3 Download up-to-date Kramer user manuals from our Web site at http://www.kramerelectronics.com

4 The complete list of Kramer cables is on our Web site at http://www.kramerelectronics.com

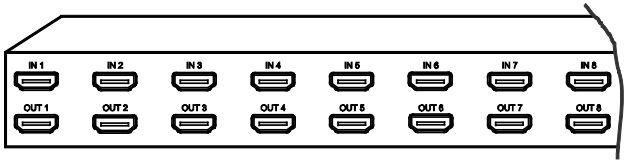
2.1 Quick Start

This quick start chart summarizes the basic setup and operation steps.

Step 1: Mount the machine - see section 5

Mount the machine in a rack or stick the 4 rubber feet to the underside

Step 2: Connect the inputs and outputs - see section 6



If required, connect a PC or a controller via the RS-232 or the ETHERNET to control the VS-88H

Step 3: Turn the power ON

Step 4: Set the machine - see section 7

ROUTE AN INPUT TO AN OUTPUT

Press an output key followed by an input key to route this input to that output.

ACQUIRE THE EDID FROM:

- A connected output
- Several sets of inputs and outputs
- Several connected outputs
- The default EDID

STORE AND RECALL A SETUP

To Store:
1. Set the machine to the desired setting.
2. Press the STO button.
   The STO button blinks.
3. Select an IN or OUT button to store the machine setting.
4. Press the LOCK button to store the current setup.

To Recall:
1. Press the RCL button.
   The RCL button blinks.
2. Press the relevant OUT button.
3. Press the LOCK button to recall the stored setting.

Step 5: Operate the machine - see section 7

Operate via the front panel buttons, IR remote control, RS-232, and ETHERNET

3 Overview

The **VS-88H** is a high quality 8x8 matrix switcher for HDMI signals that fits into one vertical space of a standard 19" professional rack enclosure.

In particular, the **VS-88H** features:

- Support for up to 2.25Gbps bandwidth per graphic channel[1]
- Support for HDCP (High Definition Digital Content Protection)
- HDMI Support – HDMI (V.1.4 with 3D, Deep Color, x.v.Color™, Lip Sync)
- 3D Pass-Through
- I-EDIDPro™ Kramer Intelligent EDID Processing™, an intelligent EDID handling and processing algorithm that ensures Plug and Play operation for HDMI systems
- An OFF button to disconnect an output
- A PANEL LOCK button to prevent unwanted tampering with the buttons on the front panel
- 16 preset memory locations for quick access to common configurations

Control the **VS-88H** using the front panel buttons, or remotely via:

- RS-232 serial commands transmitted by a touch screen system, PC, or other serial controller
- The Kramer infrared remote control transmitter
- The ETHERNET

3.1 Defining EDID

The Extended Display Identification Data (EDID[2]) is a data-structure, provided by a display, to describe its capabilities to an HDMI source. The EDID enables the **VS-88H** to "know" what kind of monitor is connected to the output. The EDID includes the manufacturer's name, the product type, the timing data supported by the display, the display size, luminance data and (for digital displays only) the pixel mapping data. See section 7.2 for details of how to acquire the EDID.

1 Suitable for resolutions up to UXGA at 60Hz, and for all HD resolutions

2 Defined by a standard published by the Video Electronics Standards Association (VESA)

3.2 About HDMI

High-Definition Multimedia Interface (HDMI) is an uncompressed all-digital[1] audio/video interface, widely supported in the entertainment and home cinema industry. It delivers the highest high-definition image and sound quality. Note that Kramer Electronics Limited is an HDMI Adopter and an HDCP Licensee.

In particular, HDMI:

- Provides a simple[2] interface between any audio/video source, such as a set-top box, DVD player, or AV receiver and video monitor, such as a digital flat LCD/plasma television (DTV), over a single lengthy[3] cable
- Supports standard, enhanced, high-definition video, and multi-channel digital audio[4] on a single cable
- Transmits all ATSC HDTV standards and supports 8-channel digital audio, with bandwidth to spare to accommodate future enhancements and requirements
- Benefits consumers by providing superior, uncompressed digital video quality via a single cable[5], and user-friendly connector
- Is backward-compatible with DVI (Digital Visual Interface)
- Supports two-way communication between the video source (such as a DVD player) and the digital television, enabling new functionality such as automatic configuration and one-button play

HDMI has the capacity to support existing high-definition video formats (720p, 1080i, and 1080p/60), as well as standard definition formats such as NTSC or PAL.

1 Ensuring an all-digital rendering of video without the losses associated with analog interfaces and their unnecessary digital-to-analog conversions

2 With video and multi-channel audio combined into a single cable, the cost, complexity, and confusion of multiple cables currently used in AV systems is reduced

3 HDMI technology has been designed to use standard copper cable construction at up to 15m

4 HDMI supports multiple audio formats, from standard stereo to multi-channel surround-sound. HDMI has the capacity to support Dolby 5.1 audio and high-resolution audio formats

5 HDMI provides the quality and functionality of a digital interface while also supporting uncompressed video formats in a simple, cost-effective manner

3.3 About HDCP

The High-Bandwidth Digital Content Protection (HDCP) standard (developed by Intel), protects digital video and audio signals transmitted over DVI or DVI connections between two HDCP-enabled devices to eliminate the reproduction of copyrighted material. To protect copyright holders (such as movie studios) from having their programs copied and shared, the HDCP standard provides for the secure and encrypted transmission of digital signals.

3.4 Recommendations for Best Performance

To achieve the best performance:

- Use only good quality connection cables[1] to avoid interference, deterioration in signal quality due to poor matching, and elevated noise levels (often associated with low quality cables).
- Avoid interference from neighboring electrical appliances that may adversely influence signal quality and position your Kramer **VS-88H** away from moisture, excessive sunlight and dust

4 Your VS-88H 8x8 HDMI Matrix Switcher

Figure 1 and Table 1 define the **VS-88H**.

1 Available from Kramer Electronics on our Web site at http://www.kramerelectronics.com

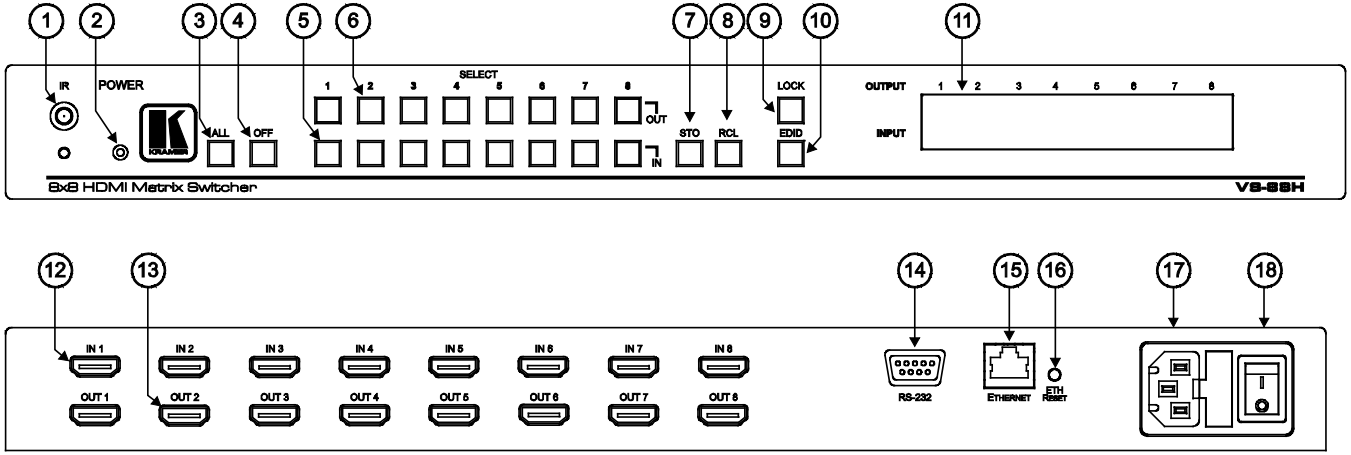


Figure 1: VS-88H 8x8 HDMI Matrix Switcher

Table 1: VS-88H 8x8 HDMI Matrix Switcher Front Panel Features

#	Feature		Function
1	IR Receiver		The yellow LED lights when receiving signals from the Infrared remote control transmitter
2	*POWER* LED		Illuminates when the unit is turned ON
3	*ALL* Button		Pressing ALL before pressing an input button, connects that input to all outputs[1]
4	*OFF* Button		Pressing OFF after pressing an output button disconnects that output from the inputs. To disconnect all the outputs, press the ALL button and then the OFF button
5	*SELECT* Buttons[2]	*IN*	Select the input to switch to the output (from 1 to 8)
6		*OUT*	Select the output to which the input is switched (from 1 to 8)
7	*STO* Button		Press to store the current settings[3] (see section 7.3)
8	*RCL* Button		Press to recall the current settings[3] (see section 7.3)
9	*LOCK* Button		Press and hold to toggle disengaging the front panel buttons and to acquire the EDID
10	*EDID* Button		Press *EDID* to capture the EDID (see section 7.2)
11	*OUTPUT/ INPUT* 7-segment LCD Display		Displays the selected input switched to the output (marked above each input)
12	*IN* HDMI Connectors		Connect to the HDMI sources (from 1 to 8)
13	*OUT* HDMI Connectors		Connect to the HDMI acceptors (from 1 to 8)
14	*RS-232* 9-pin D-sub Port		Connects to the PC or other RS-232 Remote Controller
15	*ETHERNET* Connector		Connects to the PC or other Ethernet Controller
16	*ETH RESET* Button		Press the ETHERNET factory reset button to reset to the factory default definitions[4]: IP number – 192.168.1.39 Mask – 255.255.255.0 Gateway – 192.168.1.1
17	Power Connector with Fuse		AC connector enabling power supply to the unit
18	Power Switch		Illuminated switch for turning the unit ON or OFF

1 For example, press ALL and then Input button # 2 to connect input # 2 to all the outputs

2 Are also used for storing machine setups (see section 7.3)

3 The input/output routing configuration is saved/recalled

4 First turn the VS-88H OFF and then turn it ON again while pressing the RESET button. The unit will power up and load its memory with the factory default definitions

5 Installing the VS-88H on a Rack

This section provides instructions for rack mounting the unit.

Before Installing in a Rack

Before installing in a rack, be sure that the environment is within the recommended range:

Operating temperature range	+5º to +45º C (41º to 113º F)
Operating humidity range	10 to 90% RHL, non-condensing
Storage temperature range	-20º to +70º C (-4º to 158º F)
Storage humidity range	5 to 95% RHL, non-condensing

CAUTION!

When installing on a 19" rack, avoid hazards by taking care that:

1. It is located within the recommended environmental conditions, as the operating ambient temperature of a closed or multi unit rack assembly may exceed the room ambient temperature.

2. Once rack mounted, enough air will still flow around the machine.

3. The machine is placed straight in the correct horizontal position.

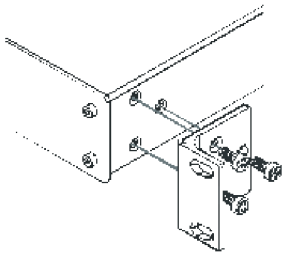
4. You do not overload the circuit(s). When connecting the machine to the supply circuit, overloading the circuits might have a detrimental effect on overcurrent protection and supply wiring. Refer to the appropriate nameplate ratings for information. For example, for fuse replacement, see the value printed on the product label.

5. The machine is earthed (grounded) in a reliable way and is connected only to an electricity socket with grounding. Pay particular attention to situations where electricity is supplied indirectly (when the power cord is not plugged directly into the socket in the wall), for example, when using an extension cable or a power strip, and that you use only the power cord that is supplied with the machine.

How to Rack Mount

To rack-mount a machine:

1. Attach both ear brackets to the machine. To do so, remove the screws from each side of the machine (3 on each side), and replace those screws through the ear brackets.



2. Place the ears of the machine against the rack rails, and insert the proper screws (not provided) through each of the four holes in the rack ears.

Note:

- In some models, the front panel may feature built-in rack ears
- Detachable rack ears can be removed for desktop use
- Always mount the machine in the rack before you attach any cables or connect the machine to the power
- If you are using a Kramer rack adapter kit (for a machine that is not 19"), see the Rack Adapters user manual for installation instructions available from: http://www.kramerelectronics.com

6 Connecting a VS-88H 8x8 HDMI Matrix Switcher

To connect the **VS-88H** *8x8 HDMI Matrix Switcher*, as illustrated in the example in Figure 2, do the following[1]:

1. Connect[2] up to eight HDMI sources (for example, DVD players) to the eight INPUT HDMI connectors.
2. Connect[3] the eight OUTPUT HDMI connectors to up to eight HDMI acceptors (for example, LCD displays with built-in speakers).
3. If required, connect a PC and/or controller to the RS-232 port (see section 7.4) and/or the ETHERNET port (see section 7.5).
4. Connect the power connector to the mains electricity (not shown in Figure 2).
5. If required, acquire the EDID (see section 7.2)

Press the SELECT IN and OUT buttons to choose which HDMI input to route to a selected output.

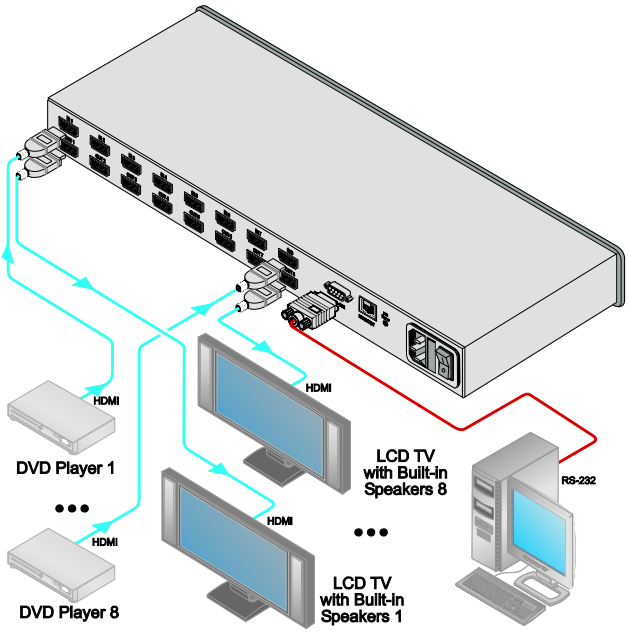


Figure 2: Connecting a VS-88H 8x8 HDMI Matrix Switcher

1 Switch OFF the power on each device before connecting it to your VS-88H. After connecting your VS-88H, switch on its power and then switch on the power on each device

2 You do not have to connect all the HDMI sources

3 You do not have to connect all the outputs

7 Operating the VS-88H 8x8 HDMI Matrix Switcher

This section describes how to:

- Route an input to an output (see section 7.1)
- Acquire the EDID (see section 7.2)
- Store and recall a setting (see section 7.3)
- Control the machine via RS-232 (see section 7.4)
- Control the machine via the ETHERNET port (see section 7.5)

7.1 Switching an Input to an Output

Press an output key, followed by an input key to route this input to that output.

7.2 Acquiring the EDID

The EDID is a data structure transmitted by the display that enables the **VS-88H** to "know" what kind of monitor is connected to the output. The **VS-88H** acquires and stores the EDID to make reconnection to the display effortless.

You can acquire the EDID:

- From one output to any of the eight inputs (see section 7.2.1)
- From several sets of inputs and outputs (see section 7.2.2)
- From the default EDID (see section 7.2.3)

7.2.1 Acquire an EDID from a Connected Output

To acquire or change the EDID of a new output display:

1. Turn the **VS-88H** ON.
2. Connect the required acceptor to the output from which you want to acquire the EDID.
3. Press the EDID and STO buttons simultaneously and hold them for 3 seconds.
   Both buttons flash.
4. Press the input button to which the EDID will be copied.
   The selected input number flashes on the display.
5. Select the output from which the EDID will be acquired.
6. Press the EDID button.
   The process is complete when the display returns to normal.

7.2.2 Acquire an EDID from Several Sets of Inputs and Outputs

To acquire the EDID for more than one output (for example, OUT 1 to IN 1 and OUT 6 to IN 3), do the following:

1. Turn the **VS-88H** ON.
2. Connect the required acceptor to the output from which you want to acquire the EDID.
3. Press the EDID and STO buttons simultaneously and hold them for 3 seconds.
   Both buttons flash.
4. Press the input button to which the EDID will be copied (for example, IN 1).
   The selected input number flashes on the display.
5. Select the output from which the EDID will be acquired (for example, OUT 1).
6. Press the IN 1 button.
   The IN 1 button ceases to flash.
7. Press the next input button to which the EDID will be copied (for example, IN 3).
   The selected input number flashes on the display.
8. Select the output from which the EDID will be acquired (for example, OUT 6).
9. Press the IN 3 button.
   The IN 3 button ceases to flash.
10. Press the input buttons to which you want to copy the EDID (for example, IN 1 and IN 3).
11. Make sure that the relevant input numbers flash on the display.
12. Press the EDID button.
    The process is complete when the display returns to normal.

7.2.3 Acquire the Default EDID

To reset to the default EDID, do the following:

1. Turn the **VS-88H** ON.
2. Press the EDID and STO buttons simultaneously and hold them for 3 seconds.
   Both buttons flash.
3. Press the input button to which the EDID will be copied.
   The selected input number flashes on the display.

4. Press the OFF button until a "0" (zero) appears on the display.
5. Press the EDID button.
   The process is complete when the display returns to normal.

7.3 Storing and Recalling a Setting

You can use the STO and RCL buttons to store up to 16 setups and then recall them.

To store a setting:

1. Set the machine to the desired setting.
   For example, press the OUT 3 button and IN 4 button[1].
2. Press the STO button.
   The STO button flashes.
3. Select an OUT or IN SELECT button to store the machine setting (for example, OUT 5).
4. Press the LOCK button[2] to store the current setup.
   In this example, the OUT 5 button stores the setting.

To recall a setup:

1. Press the RCL button.
   The RCL button flashes.
2. Press the relevant OUT or IN button that stored the setting.
   In this example, press OUT 5.
3. Press the LOCK button to recall the stored setting.

7.4 Connecting to the VS-88H via RS-232

You can connect to the **VS-88H** via an RS-232 connection using, for example, a PC. Note that a null-modem adapter/connection is not required.

To connect to the **VS-88H** via RS-232:

- Connect the RS-232 9-pin D-sub rear panel port on the **VS-88H** unit via a 9-wire straight cable (only pin 2 to pin 2, pin 3 to pin 3, and pin 5 to pin 5 need to be connected) to the RS-232 9-pin D-sub port on your PC

1 You can set all the switcher IN-OUT buttons

2 You have to press the LOCK button within 10 seconds, before the store operation times out

7.5 Controlling via ETHERNET

You can connect the **VS-88H** via the Ethernet, using a crossover cable (see section 7.5.1) for direct connection to the PC or a straight through cable (see section 7.5.2) for connection via a network hub or network router[1].

7.5.1 Connecting the ETHERNET Port directly to a PC (Crossover Cable)

You can connect the Ethernet port of the **VS-88H** to the Ethernet port on your PC, via a crossover cable with RJ-45 connectors.

This type of connection is recommended for identification of the factory default IP Address of the **VS-88H** during the initial configuration

After connecting the Ethernet port, configure your PC as follows:

1. On your desktop, right-click the My Network Places icon.
2. Select **Properties**.
3. Right-click Local Area Connection Properties.
4. Select **Properties**.
   The Local Area Connection Properties window appears.
5. Select the Internet Protocol (TCP/IP) and click the **Properties** Button (see Figure 3).

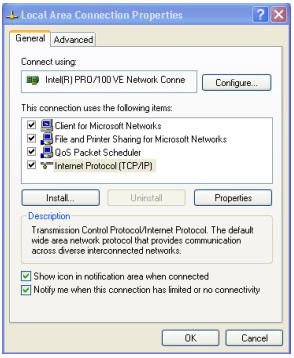


Figure 3: Local Area Connection Properties Window

1 After connecting the Ethernet port, you have to install and configure your Ethernet Port. For detailed instructions, see the "Ethernet Configuration (FC-11) guide.pdf" file in the technical support section on our Web site: http://www.kramerelectronics.com

6. Select Use the following IP Address, and fill in the details as shown in Figure 4.
7. Click **OK**.

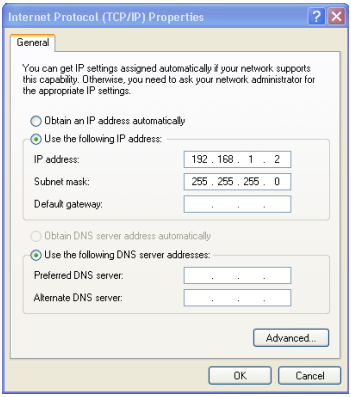

Internet Protocol (TCP/IP) Properties
General
You can get IP settings assigned automatically if your network supports this capability. Otherwise, you need to ask your network administrator for the appropriate IP settings.
Obtain an IP address automatically
Use the following IP address:
IP address:
192 . 168 . 1 . 2
Subnet mask:
255 . 255 . 255 . 0
Default gateway:
Obtain DNS server address automatically
Use the following DNS server addresses:
Preferred DNS server:
Alternate DNS server:
Advanced...
OK
Cancel

Figure 4: Internet Protocol (TCP/IP) Properties Window

7.5.2 Connecting the ETHERNET Port via a Network Hub (Straight-Through Cable)

You can connect the Ethernet port of the **VS-88H** to the Ethernet port on a network hub or network router, via a straight through cable with RJ-45 connectors.

8 Technical Specifications

The **VS-88H** technical specifications are shown in Table 2:

Table 2: Technical Specifications[1] of the VS-88H

INPUTS:	8 HDMI Connectors
OUTPUTS:	8 HDMI Connectors
BANDWIDTH:	Supports up to 2.25Gbps bandwidth per graphic channel
COMPLIANCE WITH HDMI STANDARD:	Supports HDMI and HDCP
RESOLUTION:	Up to UXGA; 1080p
POWER SOURCE:	100–240V AC, 50/60Hz, 33VA
CONTROLS:	Front panel buttons, infrared remote control transmitter, RS-232, Ethernet
DIMENSIONS:	19" x 7" x 1U (W, D, H)
WEIGHT:	2.5kg (5.5lbs) approx.
ACCESSORIES:	Power cord, IR transmitter, rack "ears"
OPTIONS:	Kramer HDMI cables[1]

1 Specifications are subject to change without notice

9 Communication Parameters

Table 3: Communication Parameters

RS-232	
Protocol 2000	
Baud Rate:	9600
Data Bits:	8
Stop Bits:	1
Parity:	None
Command Format:	HEX
Example (Output 1 to Input 1):	0x01, 0x81, 0x81, 0x81
Ethernet	
Default Settings	**Reset Ethernet Default Settings**
IP Address: 192.168.1.39	Power cycle the unit while holding in the Factory Reset button, located on the rear panel of the unit.
TCP Port #: 5000	

1 For best results, use Kramer cables such as the C-HM/HM series, the C-HM/DM series and/or our HDMI over fiber optics C-FOHM/FOHM series

10 Kramer Protocol 2000

The **VS-88H** is compatible with Kramer's Protocol 2000[1] (version 0.50) (below). This RS-232/RS-485 communication protocol uses four bytes of information as defined below. The default data rate is 9600 baud, with no parity, 8 data bits and 1 stop bit.

Table 4: Protocol Definitions

MSB							LSB
	DESTI-NATION	**INSTRUCTION**					
0	D	N5	N4	N3	N2	N1	N0
7	6	5	4	3	2	1	0
1st byte							
	INPUT						
1	I6	I5	I4	I3	I2	I1	I0
7	6	5	4	3	2	1	0
2nd byte							
	OUTPUT						
1	O6	O5	O4	O3	O2	O1	O0
7	6	5	4	3	2	1	0
3rd byte							
		MACHINE NUMBER					
1	OVR	X	M4	M3	M2	M1	M0
7	6	5	4	3	2	1	0
4th byte							

1st BYTE: Bit 7 – Defined as 0.
D – "DESTINATION": 0 - for sending information to the switchers (from the PC);
1 - for sending to the PC (from the switcher).
N5…N0 – "INSTRUCTION"
The function that is to be performed by the switcher(s) is defined by the INSTRUCTION (6 bits). Similarly, if a function is performed via the machine's keyboard, then these bits are set with the INSTRUCTION NO., which was performed. The instruction codes are defined according to the table below (INSTRUCTION NO. is the value to be set for N5…N0).

2nd BYTE: Bit 7 – Defined as 1.
I6…I0 – "INPUT".
When switching (ie. instruction codes 1 and 2), the INPUT (7 bits) is set as the input number which is to be switched. Similarly, if switching is done via the machine's front-panel, then these bits are set with the INPUT NUMBER which was switched. For other operations, these bits are defined according to the table.

3rd BYTE: Bit 7 – Defined as 1.
O6…O0 – "OUTPUT".
When switching (ie. instruction codes 1 and 2), the OUTPUT (7 bits) is set as the output number which is to be switched. Similarly, if switching is done via the machine's front-panel, then these bits are set with the OUTPUT NUMBER which was switched. For other operations, these bits are defined according to the table.

4th BYTE: Bit 7 – Defined as 1.
Bit 5 – Don't care.
OVR – Machine number override.
M4…M0 – MACHINE NUMBER.
Used to address machines in a system via their machine numbers. When several machines are controlled from a single serial port, they are usually configured together with each machine having an individual machine number. If the OVR bit is set, then all machine numbers will accept (implement) the command, and the addressed machine will reply.
For a single machine controlled via the serial port, always set M4…M0 = 1, and make sure that the machine itself is configured as MACHINE NUMBER = 1.

1 The instruction codes in Table 4 are a sub-set of the Protocol 2000. You can find the full protocol on our Web site at http://www.kramerelectronics.com

Table 5: Instruction Codes for Protocol 2000

Note: All values in the table are decimal, unless otherwise stated.

INSTRUCTION		DEFINITION FOR SPECIFIC INSTRUCTION		NOTE
#	DESCRIPTION	INPUT	OUTPUT	
0	RESET VIDEO	0	0	1
1	SWITCH VIDEO	Set equal to video input which is to be switched (0 = disconnect)	Set equal to video output which is to be switched (0 = to all the outputs)	2, 15
3	STORE VIDEO STATUS	Set as SETUP #	0 - to store 1 - to delete	2, 3, 15
4	RECALL VIDEO STATUS	Set as SETUP #	0	2, 3, 15
5	REQUEST STATUS OF A VIDEO OUTPUT	Set as SETUP #	Equal to output number whose status is reqd	4, 3
15	REQUEST WHETHER SETUP IS DEFINED/VALID INPUT IS DETECTED	SETUP # or Input #	0 - for checking if setup is defined 1 - for checking if input is valid	8
30	LOCK FRONT PANEL	0 - Panel unlocked 1 - Panel locked	0	2
31	REQUEST WHETHER PANEL IS LOCKED	0	0	16
61	IDENTIFY MACHINE	1 - video machine name 2 - audio machine name 3 - video software version 4 - audio software version 5 - RS422 controller name 6 - RS422 controller version 7 - remote control name 8 - remote software version 9 - Protocol 2000 revision	0 - Request first 4 digits 1 - Request first suffix 2 - Request second suffix 3 - Request third suffix 10 - Request first prefix 11 - Request second prefix 12 - Request third prefix	13
62	DEFINE MACHINE	1 - number of inputs 2 - number of outputs 3 - number of setups	1 - for video 2 - for audio 3 - for SDI 4 - for remote panel 5 - for RS-422 controller	14

NOTES on the above table:

NOTE 1 - When the master switcher is reset, (e.g. when it is turned on), the reset code is sent to the PC. If this code is sent to the switchers, it will reset according to the present power-down settings.

NOTE 2 - These are bi-directional definitions. That is, if the switcher receives the code, it will perform the instruction; and if the instruction is performed (due to a keystroke operation on the front panel), then these codes are sent. For example, if the HEX code
01 85 88 83
was sent from the PC, then the switcher (machine 3) will switch input 5 to output 8. If the user switched input 1 to output 7 via the front panel keypad, then the switcher will send HEX codes:
41 81 87 83
to the PC.
When the PC sends one of the commands in this group to the switcher, then, if the instruction is valid, the switcher replies by sending to the PC the same four bytes that it was sent (except for the first byte, where the DESTINATION bit is set high).

NOTE 3 - SETUP # 0 is the present setting. SETUP # 1 and higher are the settings saved in the switcher's memory, (i.e. those used for Store and Recall).

NOTE 4 - The reply to a "REQUEST" instruction is as follows: the same instruction and INPUT codes as were sent are returned, and the OUTPUT is assigned the value of the requested parameter. The replies to instructions 10 and 11 are as per the definitions in instructions 7 and 8 respectively. For example, if the present status of machine number 5 is breakaway setting, then the reply to the HEX code

0B 80 80 85
would be HEX codes
4B 80 81 85

NOTE 8 - The reply is as in TYPE 3 above, except that here the OUTPUT is assigned with the value 0 if the setup is not defined/no valid input is detected; or 1 if it is defined/valid input is detected.

NOTE 13 - This is a request to identify the switcher/s in the system. If the OUTPUT is set as 0, and the INPUT is set as 1, 2, 5 or 7, the machine will send its name. The reply is the decimal value of the INPUT and OUTPUT. For example, for a 2216, the reply to the request to send the audio machine name would be (HEX codes):

7D 96 90 81 (i.e. 128dec+ 22dec for 2nd byte, and 128dec+ 16dec for 3rd byte).

If the request for identification is sent with the INPUT set as 3 or 4, the appropriate machine will send its software version number. Again, the reply would be the decimal value of the INPUT and OUTPUT - the INPUT representing the number in front of the decimal point, and the OUTPUT representing the number after it. For example, for version 3.5, the reply to the request to send the version number would be (HEX codes):

7D 83 85 81 (i.e. 128dec+ 3dec for 2nd byte, 128dec+ 5dec for 3rd byte).

If the OUTPUT is set as 1, then the ASCII coding of the lettering following the machine's name is sent. For example, for the VS-7588YC, the reply to the request to send the first suffix would be (HEX codes):

7D D9 C3 81 (i.e. 128dec+ ASCII for "Y"; 128dec+ ASCII for "C").

NOTE 14 - The number of inputs and outputs refers to the specific machine which is being addressed, not to the system. For example, if six 16X16 matrices are configured to make a 48X32 system (48 inputs, 32 outputs), the reply to the HEX code

3E 82 81 82 (ie. request the number of outputs)

would be HEX codes

7E 82 90 82

ie. 16 outputs

NOTE 15 – When the OVR bit (4th byte) is set, then the "video" commands have universal meaning. For example, instruction 1 (SWITCH VIDEO) will cause all units (including audio, data, etc.) to switch. Similarly, if a machine is in "FOLLOW" mode, it will perform any "video" instruction.

NOTE 16 - The reply to the "REQUEST WHETHER PANEL IS LOCKED" is as in NOTE 4 above, except that here the OUTPUT is assigned with the value 0 if the panel is unlocked, or 1 if it is locked.

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CFR-47:	FCC* Rules and Regulations: Part 15: "Radio frequency devices Subpart B Unintentional radiators"

CAUTION!

- Servicing the machines can only be done by an authorized Kramer technician. Any user who makes changes or modifications to the unit without the expressed approval of the manufacturer will void user authority to operate the equipment.
- Use the supplied DC power supply to feed power to the machine.
- Please use recommended interconnection cables to connect the machine to other components.

* FCC and CE approved using STP cable (for twisted pair products)

For the latest information on our products and a list of Kramer distributors, visit our Web site: www.kramerelectronics.com, where updates to this user manual may be found.
We welcome your questions, comments and feedback.

Safety Warning:
Disconnect the unit from the power supply before opening/servicing.

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